

Appendix A

Forest Plan Standards and Guidelines, Regional Watershed Conservation Practices, and Noxious Weed Prevention Practices Applicable to Implementation of the Burner Project

This appendix includes Forest Plan standards and guidelines, Regional Watershed Conservation Practices, and noxious weed prevention practices applicable to the Burner project. Implementation of these measures in addition to the site-specific design criteria found in Chapter 2 of the Burner Project Environmental Assessment will protect resources found in the project area and ensure compliance with legal requirements and consistency with Forest Plan direction.

Sources:

Black Hills National Forest Land and Resource Management Plan (as amended)
Region 2 Watershed Conservation Practices (FSH 2509.25)
USDA Forest Service Guide to Noxious Weed Prevention Practices

Forest Plan Standards and Guidelines

A **standard** is defined as a limitation on management activities that is within the authority and ability of the agency to meet or enforce. Standards are used to determine if individual projects are in compliance with the Forest Plan. Deviation from a standard requires a Forest Plan amendment.

A **guideline** is a preferred or advisable course of action. Deviation from a guideline is permissible if the responsible official documents the reasons for the deviation.

Soil Productivity

1101. When doing projects, analyze the cumulative effects of disturbances on long-term soil productivity. **STANDARD**

1102. Maintain or improve long-term levels of organic matter and nutrients on all lands. **STANDARD** (Regional WCP Handbook Management Measure 14)

Soil Disturbance

1103. Manage land treatments to limit the sum of severely burned and detrimentally compacted, eroded, and displaced land to no more than 15 percent of any land unit. “Land treatments” are human actions that disturb vegetation, ground cover, or soil. “Land unit” is a mapped land type polygon or a mapped soil unit. **STANDARD** (Regional WCP Handbook Management Measure 13)

1104. Minimize soil compaction by reducing off-road vehicle passes, by skidding on snow or frozen or dry soil conditions, or by off-ground logging systems. **GUIDELINE**

1105. Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate. **STANDARD** (Regional WCP Handbook Management Measure 9)

1106. Stabilize and maintain roads and other disturbed sites during and after construction to control erosion. **STANDARD** (Regional WCP Handbook Management Measure 11)

Slope Stability

1108. Reduce resource damage and investment loss in areas that have a mass movement potential. a) Perform an on-site slope-stability examination on slopes over 30 percent prior to design roads or activities that remove most or all of the timber canopy for the following areas and

soils: 1) Lakoa, Larkson, and Citadel soils found in the Bear Lodge Mountains; 2) Rockoa and Mathias soils on the Dakota Hogback; and 3) Citadel soil found in the northern and eastern Black Hills. b) Perform an on-site slope-stability examination on slopes over 55 percent prior to design of roads or activities that remove most or all of the timber canopy on all other soil types. Limit intensive ground-disturbing activities on unstable slopes identified during slope-stability exams. **GUIDELINE**

Rehabilitation and Revegetation

1109. Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage. **STANDARD** (Regional WCP Handbook Management Measure 12)

1110. Initiate re-vegetation as soon as possible, not to exceed 6 months after termination of ground-disturbing activities. **STANDARD**

1111. Stabilize, scarify, or recontour temporary roads, constructed skid trails, and landings prior to seeding. **GUIDELINE**

Surface Water Runoff

1112. Manage land treatments to maintain enough organic ground cover in each land unit to prevent harmful increased runoff. **STANDARD** (Regional WCP Handbook Management Measure 2)

1113. Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands. **STANDARD** (Regional WCP Handbook Management Measure 10)

1114. When construction of maintenance level 1 roads, temporary roads, skid trails, and landings occurs, install structures to divert runoff when needed. **STANDARD**

1115. When ground-disturbing or vegetation management actions occur, use vegetative buffer strips or barriers to reduce sediment. Determine buffer width between stream and roads or trails using the equation in Appendix J. **GUIDELINE**

1116. Manage land treatments to conserve site moisture and protect long-term stream health from damage by increased runoff. **STANDARD** (Regional WCP Handbook Management Measure 1)

Stream Channels

1201. Conduct actions so that stream pattern, geometry, and habitats are maintained or improved toward robust stream health. **STANDARD** (Regional WCP Handbook Management Measure 5)

1203. Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life. **STANDARD** (Regional WCP Handbook Management Measure 4)

1204. Naturally occurring debris shall not be removed from stream channels unless it is a threat to life, property, important resource values, or otherwise covered by a legal agreement. **GUIDELINE**

1205. When projects are implemented which can affect large, woody debris, retain natural and beneficial volumes of large, woody debris for fish habitat, stream energy dissipation, and as sources of organic matter for the stream ecosystem. **GUIDELINE**

1206. When stabilizing damaged stream banks, preferentially use methods that emphasize vegetative stabilization. Use native vegetation for streambank stabilization whenever possible. **GUIDELINE**

Instream Flows

1209. Manage vegetation treatments so that stream flows are not changed to the extent that long-term stream health is degraded. **STANDARD**

Water Quality

1211. Place new sources of chemical and pathogenic pollutants where such pollutants will not reach surface or ground water. **STANDARD** (Regional WCP Handbook Management Measure 15)

1212. Apply runoff controls to disconnect new pollutant sources from surface and ground water. **STANDARD** (Regional WCP Handbook Management Measure 16)

1213. Apply chemicals using methods that minimize risk of entry to surface and ground water. **STANDARD** (Regional WCP Handbook Management Measure 17)

1214. When natural background water pollutants cause degradation, it is not necessary to implement improvement actions. Short-term or temporary failure to meet some parameters of the applicable federal or state standard, such as increase sediment from road crossing construction or water development, may be permitted in special cases. **GUIDELINE**

Riparian Areas, Water Influence Zones, and Wetlands

1301. In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition. **STANDARD** (Regional WCP Handbook Management Measure 3)

1302. Maintain long-term ground cover, soil structure, water budgets, and flow patterns in wetlands to sustain their ecological function, per 404 regulations. **STANDARD** (Regional WCP Handbook Management Measure 6)

1304. As opportunities arise, and need dictates, relocate or implement mitigation measures for roads, trails, watering tanks, ponds, water catchments, and similar facilities currently located within the Water Influence Zone. **STANDARD**

1306. Prohibit log landing, decking areas and mechanical slash piling within riparian areas unless the integrity of the riparian area can be protected (e.g. frozen, snow-covered ground conditions). **STANDARD**

Structural Diversity

2101. The maximum size of openings created by even-aged management will be 40 acres, regardless of forest type, with the following exceptions: a) Where proposals for larger openings are approved by the Regional Forester after a 60-day public review; b) Where larger openings are the result of natural catastrophic conditions of fire, insect or disease attack, or windstorm; and c) Where the area that is cut does not meet the definition of created openings. **STANDARD** (Amended Regional Guide Silviculture Standards)

2102. The maximum width of openings created by the application of uneven-aged silviculture will be no greater than one to two tree-heights regardless of forest cover type. **GUIDELINE** (Amended Regional Guide Silviculture Standards)

2105. When developing openings in vegetative communities, copy naturally shaped edges.
GUIDELINE

Snags

2301. a) Retain all snags greater than 20 inches DBH unless a safety hazard. If snag densities within a project area are below Objective 211, retain all snags unless they are a safety hazard. If large snags (>14 inches DBH) are not available, retain snags in the largest size class available. This standard does not apply to areas salvaged under Objective 11-03. **STANDARD**

2304. Prohibit culling of standing-dead trees for fuelwood, except in designated areas. **STANDARD**

2305. All soft snags should be retained unless they are a safety hazard. **STANDARD**

Down Woody Material

2307. Leave large woody debris on harvested or thinned sites to help retain moisture, trap soil movement, provide microsites for establishment of forbs, grasses, shrubs, and trees, and to provide habitat for wildlife. **GUIDELINE**

2308. During vegetation management activities on ponderosa pine forested sites, retain an average of at least 50 linear feet per acre of coarse woody debris with a minimum diameter of 10 inches. **STANDARD**

Silvicultural Prescriptions

2409. For precommercial and commercial thinning: a) Use thinning practices that consider genetic diversity and competition among the trees for water, nutrients, and light. The frequency of thinning should depend on the tree species, financial efficiency, and site growing conditions. b) In general, use the stocking charts in Appendix H to implement intermediate cuttings in even-aged, suitable timberland stands to effectively meet land management direction and as a guideline for individual stand management. **GUIDELINE**

2410. If the silviculture system being applied to a particular area of the landscape is uneven-aged, harvest trees designated for commercial timber production based on the desired density as determined by age class or size, and the objective for the area. **GUIDELINE** (Amended Regional Guide Silviculture Guideline)

2415. Regulate logging activities in campgrounds so they do not conflict with the managed use season, the ROS class, or the adopted SIO. **GUIDELINE**

Reforestation

2416. The following restocking requirements apply on lands identified as suitable and available for timber production. a) When trees are harvested to meet timber production objectives, the cutting should be made in such a way that there is assurance that the technology and knowledge exists to adequately restock these areas with trees within 5 years after final harvest. **STANDARD** (Amended Regional Guide Silviculture Standard)

Endangered and Threatened Species

3101. To protect endangered and threatened species: b. Prohibit new disturbances not existing at the time of bald eagle nest initiation that may detrimentally influence nest success within one mile of bald eagle nests during the nesting season (February 1 through September 1). The distance may be reduced where forest characteristics or topography reduce the line-of-sight

distance from the nest, based on site-specific analysis. c) Protect traditional communal bald eagle winter roost sites. Restrict activities that may disturb bald eagles within one mile of communal roosting areas from November 1 through April 1. d) In stands being used by bald eagles on a transitory basis, avoid timber harvest activities when in use. Harvest may resume when birds have vacated the stands. **STANDARD**

Sensitive Species

3103. Manage known sensitive species and species of local concern snail colonies to: a) Retain overstory sufficient to maintain moisture regimes, ground level temperatures, and humidities. b) Retain ground litter, especially deciduous litter. c) Avoid burning, heavy grazing, off-highway vehicles (OHVs), heavy equipment, and other activities that may compact soils or alter vegetation composition and ground cover. d) If prescribed burning is unavoidable, burn when snails are hibernating, usually below 50 degrees Fahrenheit, and use fast-moving fires to minimize effects to snails. e) Control invasive weeds, but use herbicides when snails are not on the surface, and treat individual plants rather than broadcast application. **STANDARD**

3106. Riparian areas or wetlands where populations of sensitive species are located are to be avoided during ground disturbing activities. Use one or more of the following (or other mitigation measures) tied to the site-specific conditions for disturbances adjacent to known occurrences: a) Avoid removing riparian or wetland vegetation; filling or dredging the riparian area or wetland; diverting stream flow from the current channel. b) Prevent storm runoff from washing silt into the stream or wetland. c) Reseed and/or replant cut and fill slopes with native seed and/or native plants promptly to control erosion and for prevention of noxious weed infestation. Use appropriate measures to control erosion on disturbed areas that are steep, highly erosive, and/or adjacent to the riparian area. d) Timing, placement, and installation of temporary stream diversions shall allow passage of aquatic life and protect sensitive species and species of local concern. **STANDARD**

Sensitive Species – Goshawks

3108. The following additional protective measures will apply relative to northern goshawk for all projects involving removal of trees in suitable habitat, except those done for the express purpose of enhancing goshawk habitat: a)...Vegetation management activities within nest areas shall be limited to those that maintain or enhance the stand's value for goshawk. **STANDARD**

3111. From April 1 through August 15, minimize additional human-caused noise and disruption beyond that occurring at the time of nest initiation (e.g., road traffic, timber harvests, construction activities) within one-half mile of all active goshawk nests up until the nest has failed or fledglings have dispersed. **STANDARD**

Sensitive Species and Contractual Obligations

3115. An R2 sensitive species or species of local concern located after contract or permit issuance will be appropriately managed by active coordination between permittee, contractor or purchaser, Forest Service line officer, project administrator, and biologist and/or botanist. Solutions need to be based on the circumstances of each new discovery and must consider the species need, contractual obligations and costs, and mitigation measures available at the time of discovery. **STANDARD**

3116. Avoid creating barriers (e.g., new open roads) between redbelly snake hibernacula and wetlands. **STANDARD**

3117. In vegetation treatment units, leave one pile of woody material per two acres to create near-ground structure for small mammal species, except within 300 feet of buildings. **STANDARD**

General Wildlife and Fish Direction

3203. Provide big game screening along at least 20 percent of the edges of arterial and collector roads. Consider vegetation, slopes, landform, etc. in evaluating available screening. **GUIDELINE**

3204. Protect known raptor nests. Consider potential effects of disturbance, nesting phenology, human activities existing at onset of nest initiation, species, topography, other R2 sensitive species and species of local concern, forest cover, nest protection standards and recommendations used by state and federal agencies, and other appropriate factors when designing protection. **STANDARD**

3205. Provide at least 2 to 6 turkey-roost sites per section, consisting of mature trees with an average DBH of 10 to 14 inches, widely spaced horizontal branches, and basal areas at least 90 square feet per acre. Sites should be at least one-fourth acre in size and not isolated from adjacent forested stands. Emphasis should be on the upper third of east-facing slopes if available. **GUIDELINE**

3207. Where caves or abandoned mines serve as nurseries or hibernacula for bats, vegetative changes within 500 feet of the opening are allowed only if needed to maintain bat habitat or if topography or other features protect the openings from disturbance. **STANDARD**

Prescribed Fire

4106. Promote revegetation of prescribed burn areas. a) Following broadcast burning, seed to initiate revegetation if ground cover is 60 percent or less and slopes are 30 percent or more. b) If piled and burned fuel creates ash piles deeper than three inches, scatter the ash, scarify and mix it with mineral soil, or bury it. **GUIDELINE**

4107. Defer prescribed burned areas from livestock grazing for a portion or all of the following growing season to ensure regrowth of forage species. **GUIDELINE**

4108. Prescribed burn plans will identify acceptable levels of tree mortality for seedling/saplings, poles, and sawtimber; burning prescriptions will be established to meet these levels. In planning prescribed burns, consider how the potential loss of trees is offset by the beneficial effects of fire in terms of overall stand health and wood fiber production. Consider value recovery if tree mortality exceeds project objectives. **GUIDELINE**

Fuel Treatment

4110. Base activity and natural fuel treatment on area matrix values within the Black Hills National Forest Fire Protection Assessment in accordance with the following. a) In areas identified as having high ratings for risk, hazard, or value: 1) Reduce or otherwise treat all fuels (activity fuels within three years of cutting) so the potential fireline intensity does not exceed 200 BTUs/second/foot on 90 percent of the days when fires occur, or break up continuous fuel concentrations exceeding the above intensity into units 30 to 40 acres maximum size, surrounded by fuel breaks. 2) Interim activity fuel treatment will be accomplished by requiring all slash to be lopped to 18 inches or less at the time of cutting. b) In areas identified as having moderate ratings for risk, hazard, or value: 1) Reduce or otherwise treat all fuels (activity fuels within three years of cutting) so the potential fireline intensity does not exceed 300 BTUs/second/foot on 90 percent of the days when fires occur, or break up continuous fuel concentrations exceeding the above

intensity into units 40 to 50 acres maximum size, surrounded by fuel breaks. 2) Interim activity fuel treatment will be accomplished by requiring all slash to be lopped to 18 inches or less at the time of cutting. c) In areas identified as having low ratings for risk, hazard, or value: 1) Reduce or otherwise treat all fuels (activity fuels within three years of cutting) so the potential fireline intensity does not exceed 400 BTUs/second/foot on 90 percent of the days when fires occur, or break up continuous fuel concentrations exceeding the above intensity into units 40 to 50 acres maximum size, surrounded by fuel breaks. 2) Interim activity fuel treatment will be accomplished by requiring all slash to be lopped to 24 inches or less at the time of cutting. **GUIDELINE**

4111. Locate slash piles that are scheduled for burning out of meadows that contribute to Waters of the United States. Use a buffer distance designed to keep sediment, ash, and debris out of channels. See Appendix J. **GUIDELINE**

4112. Treat activity fuels adjacent to roads and trails as follows: a) For Forest System Roads classified as collectors, and Forest System Trails, manage activity fuels to meet the adopted SIO. b) For federal, state, county, and Forest System Roads classified as arterials, remove 70 to 90 percent of the activity fuels seen from the road's edge up to a maximum distance of 300 feet. Treat debris within one year of harvest completion. **GUIDELINE**

Insects and Diseases

4202. In high use areas identify hazard trees, such as those weakened, damaged, or killed by insects and diseases, that may pose a threat to people, property, and other high-value resources, and schedule management activities to remove hazards to minimize adverse risks. Prioritize according to risk and values. **GUIDELINE**

4203. Where buildup of *Ips* populations poses a threat to management objectives, especially in developed recreation and dry sites and adjacent to other land ownerships where insect spread may cause concern, avoid leaving concentrations of fresh (green) slash and logging debris greater than two inches in diameter during spring (April through June). Lop and scatter promotes faster drying than piling slash, so this method of treatment may be more appropriate for use in high-risk *Ips* areas. **GUIDELINE**

Noxious Weeds

4301. For all proposed projects or activities, determine the risk of noxious-weed introduction or spread, and implement appropriate mitigation measures and treatment. **STANDARD**

4302. Use biological control methods whenever practical, and whenever protecting other resources such as water quality is desired. **GUIDELINE**

4304. Treat individual plants or groups of plants in areas where R2 sensitive species or species of local concern plants occur. Use a treatment method that poses the least risk to the species being protected. **STANDARD**

4306. Use certified noxious-weed-free seed, feed, and mulch. Seed will be tested for noxious weeds at the time of purchase. **STANDARD**

4308. Use buffers around water sources, lakes, wetlands, and streams to keep concentrations of chemical agents in water well below those harmful to drinking, irrigation, aquatic life, and non-target vegetation. Treatment of individual plants with aquatic-labeled chemical agents may occur in buffers. **STANDARD**

Scenery Management

5606. Where the scenic integrity objectives criterion is high or moderate, meet the criterion within one full growing season after completion of a project. In the wildland-urban interface, the moderate SIO should be met within two to four years after the fire-hazard objective is met. Future management activities in WUIs will meet SIO within one year of treatment. Where it is low or very low, meet the criterion within three full growing seasons after completion of a project. **GUIDELINE**

5610. Within the immediate foreground of primary travelways/use areas, manage tree stands to enhance the scenic quality and recreational opportunities. Manage for a variety of scenic quality and recreational opportunities. Manage for a variety of scenic conditions, including areas of large, yellow-barked ponderosa pine, areas of hiding cover for wildlife, and areas with open, park-like conditions, except as needed to meet Objective 10-02. **GUIDELINE**

5611. Vary stand densities to create vegetative diversity in areas with an adopted SIO of moderate or high. **GUIDELINE**

Transportation and Travel Management in Riparian Areas and Wetlands

9107. Prohibit land vehicles from entering perennial streams where resource damage would occur except to cross at specified points. **GUIDELINE**

Forest Development Roads

9202. Reduce the long-term impact of roads on soils: a) Revegetate the entire road prism of temporary and local native-surface roads upon completion of project work; b) Revegetate cut and fill slopes of all newly constructed or reconstructed roads; c) Give roads and trails special design considerations to prevent resource damage on capability areas containing soils with high shrink/swell capacity; d) Provide permanent drainage and establish protective vegetative cover on all new temporary roads or equipment ways, and all existing roads that are being removed from the transportation system; and e) Provide adequate road and trail cross-drainage to reduce erosion. **GUIDELINE**

9204. Reduce the impact of new Forest System and temporary road construction on wildlife. New roads will generally not be located in meadows. When topography allows, roads should not be within 400 feet of the meadow edge. **GUIDELINE**

Trails

9301. When planning and implementing resource management projects, protect or enhance Forest System Trails and their associated Recreation Opportunity Spectrum experience. **STANDARD**

Management Area 3.32

3.32-2101. Management activities should replicate biological processes found in the area and strive to replicate natural vegetative patterns and patch size. **GUIDELINE**

3.32-4101. Utilize appropriate fuel treatment practices, including prescribed fire, to achieve resource management objectives. **GUIDELINE**

3.32-5101. All resource management activities should be compatible with and minimize impacts to recreational resources and opportunities. **GUIDELINE**

3.32-9101. Motorized road and off-road vehicle travel is prohibited. There may be exceptions for main Forest System Roads and administrative use. **GUIDELINE**

Management Area 5.1

5.1-4101. Utilize appropriate fuel treatment practices, including prescribed fire, to meet management objectives. **GUIDELINE**

5.1-9101. Off-road motorized travel is allowed unless restricted by a project decision. **GUIDELINE**

5.1-9102. Motorized road travel is allowed unless restricted by a project decision. **GUIDELINE**

5.1-9103. Over-the-snow motorized travel is allowed unless restricted by a project decision. **GUIDELINE**

Management Area 5.4

5.4-3201. Temporary openings in the grass/forb stage should be between 1 and 10 acres. **GUIDELINE**

5.4-4101. Utilize appropriate fuel treatment practices, including prescribed fire, to achieve resource management objectives. **GUIDELINE**

5.4-4102. Emphasize the use of prescribed fire as a tool to increase the density, vigor, and nutritional value of important forage plants for improved health of wintering big game animals. **GUIDELINE**

5.4-9101. Off-road motorized travel is prohibited from December 15 through May 15. **STANDARD**

5.4-9102. Motorized road travel may be restricted. **GUIDELINE**

5.4-9103. Over-the-snow motorized travel is restricted to designated routes and areas. **STANDARD**

Watershed Conservation Practices

Management Measure 1. Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff.

Design Criteria:

- a) In each watershed containing a 3-rd order and larger stream, limit connected disturbed areas so the total stream network is not expanded by more than 10 percent. Progress toward zero connected disturbed area as much as practicable. Where it is impossible or impracticable to disconnect a particular connected disturbed area, minimize the areal extent of the individual connected disturbed area as much as practicable. In watersheds that contain stream reaches in diminished stream health class, allow only those actions that will maintain or reduce watershed-scale Connected Disturbed Area.
- b) Design the size, orientation, and surface roughness (that is, slash and other features that would trap and hold snow on site) of forest openings to prevent snow scour and site desiccation.

Management Measure 2. Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff.

Design Criteria:

- a) Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site.
- b) Restore the organic ground cover of degraded activity areas within the next plan period, using certified local native plants as practicable; avoid persistent or invasive exotic plants.

Management Measure 3. In the water influence zone (WIZ) next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.

Design Criteria:

- a) Allow no action that will cause long-term change to a lower stream health class in any stream reach. In degraded systems (that is, At-risk or Diminished stream health class), progress toward robust stream health within the next plan period.
- b) Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. Consider management of stream temperature and large woody debris recruitment when determining desired vegetation community. In degraded systems, progress toward desired condition within the next plan period.
- c) Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least one foot of packed

snow or two inches of frozen soil. Keep heavy equipment out of streams during fish spawning, incubation, and emergence periods.

- d) Ensure at least one-end log suspension in the WIZ. Fell trees in a way that protects vegetation in the WIZ from damage. Keep log landings and skid trails out of the WIZ, including swales.
- l) Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs.
- n) Emphasize natural stabilization processes consistent with the stream type and capability (Rosgen and Proper Functioning Condition processes) when restoring damaged stream banks. Use native vegetation for stream bank stabilization whenever practicable.

Management Measure 4. Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life.

Design Criteria:

- a) Install stream crossings to meet Corps of Engineers and State permits, pass normal flows, and be armored to withstand design flows.
- b) Size culverts and bridges to pass debris. Engineers work with hydrologists and aquatic biologists on site design.
- c) Install stream crossings on straight and resilient stream reaches, as perpendicular to flow as practicable, and to provide passage of fish and other aquatic life.
- d) Install stream crossings to sustain bankfull dimensions of width, depth, and slope and keep streambeds and banks resilient. Favor bridges, bottomless arches or buried pipe-arches for those streams with identifiable flood plains and elevated road prisms, instead of pipe culverts. Favor armored fords for those streams where vehicle traffic is either seasonal or temporary, or the ford design maintains the channel pattern, profile and dimension.

Management Measure 5. Conduct actions so that stream pattern, geometry, and habitats maintain or improve long-term stream health.

Design Criteria:

- a) Add or remove rocks, wood, or other material in streams or lakes only if such action maintains or improves stream and lake health. Leave rocks and portions of wood that are embedded in beds or banks to prevent channel scour and maintain natural habitat complexity.

Management Measure 6. Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function.

Design Criteria:

- a) Keep ground vehicles out of wetlands unless protected by at least one foot of packed snow or two inches of frozen soil. Do not disrupt water supply or drainage patterns into wetlands.

- b) Keep roads and trails out of wetlands unless there is no other practicable alternative. If roads or trails must enter wetlands, use bridges or raised prisms with diffuse drainage to sustain flow patterns. Set crossing bottoms at natural levels of channel beds and wet meadow surfaces. Avoid actions that may dewater or reduce water budgets in wetlands.
- c) Avoid long-term reduction in organic ground cover and organic soil layers in any wetland (including peat in fens).
- f) Do not build firelines in or around wetlands unless needed to protect life, property, or wetlands. Use hand lines with minimum feasible soil disturbance. Use wetland features as firelines if practicable.

Management Measure 9. Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate.

Design Criteria:

- a) Construct roads on ridge tops, stable upper slopes, or wide valley terraces if practicable. Stabilize soils onsite. End-haul soil if full-bench construction is used. Avoid slopes steeper than 70 percent.
- b) Avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions to protect soil and water.
- c) Install cross-drains to disperse runoff into filter strips and minimize connected disturbed areas. Make cuts, fills, and road surfaces strongly resistant to erosion between each stream crossing and at least the nearest cross-drain. Revegetate using certified local native plants as practicable; avoid persistent or invasive exotic plants.
- d) Construct roads, where practicable, with outslope and rolling grades instead of ditches and culverts.
- e) Retain stabilizing vegetation on unstable soils. Avoid new roads or heavy equipment use on unstable or highly erodible soils.
- f) Use existing roads unless other options will produce less long-term sediment. Reconstruct for long-term soil and drainage stability.
- g) Avoid ground skidding on sustained slopes steeper than 40 percent and on moderate to severely burned sustained slopes greater than 30 percent. Conduct logging to disperse runoff as practicable.
- i) During and following operations on outsloped roads, retain drainage and remove berms on the outside edge except those intentionally constructed for protection of road grade fills.
- j) Locate and construct log landings in such a way to minimize the amount of excavation needed and to reduce the potential for soil erosion. Design landings to have proper drainage. After use, treat landings to disperse runoff and prevent surface erosion and encourage revegetation.

Management Measure 10. Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands.

Design Criteria:

- a) Design all roads, trails, and other soil disturbances to the minimum standard for their use and to "roll" with the terrain as feasible.
- b) Use filter strips, and sediment traps if needed, to keep all sand-sized sediment on the land and disconnect disturbed soil from streams, lakes, and wetlands. Disperse runoff into filter strips.
- c) Key sediment traps into the ground. Clean them out when 50 percent full. Remove sediment to a stable, gentle, upland site and revegetate.
- d) Keep heavy equipment out of filter strips except to do restoration work or build armored stream or lake approaches. Yard logs up out of each filter strip with minimum disturbance of ground cover.
- e) Build firelines outside filter strips unless tied into a stream, lake, or wetland as a firebreak with minimal disturbed soil. Retain organic ground cover in filter strips during prescribed fires.
- f) Design road ditches and cross drains to limit flow to ditch capacity and prevent ditch erosion and failure.

Management Measure 11. Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.

Design Criteria:

- a) Do not encroach fills or introduce soil into streams, swales, lakes, or wetlands.
- b) Properly compact fills and keep woody debris out of them. Revegetate cuts and fills upon final shaping to restore ground cover, using certified local native plants as practicable; avoid persistent or invasive exotic plants. Provide sediment control until erosion control is permanent.
- c) Do not disturb ditches during maintenance unless needed to restore drainage capacity or repair damage. Do not undercut the cut slope.
- d) Space cross drains according to road grade and soil type as indicated below: (see example 01, FSH 2509.25). Do not divert water from one stream to another.
- e) Empty cross drains onto stable slopes that disperse runoff into filter strips. On soils that may gully, armor outlets to disperse runoff. Tighten cross-drain spacing so gullies are not created.
- f) Armor rolling dips as needed to prevent rutting damage to the function of the rolling dips. Ensure that road maintenance provides stable surfaces and drainage.

- g) Where berms must be used, construct and maintain them to protect the road surface, drainage features, and slope integrity while also providing user safety.
- h) Build firelines with rolling grades and minimum downhill convergence. Outslope or backblade, permanently drain, and revegetate firelines immediately after the burn. Use certified local native plants as practicable; avoid persistent or invasive exotic plants.
- i) Use the minimum amount of sand, salt, and/or other de-icing substances (Mag-Chloride) as necessary to provide safe winter travel conditions. Design paved roads and parking lots to facilitate sand removal (that is curbs or paved ditches). Use filter strips or other trapping methods to reduce movement of de-icing materials into near-by water bodies. Do not deposit sediment into streams or on streambanks along roads.
- j) During winter operations, maintain roads as needed to keep the road surface drained during thaws and break-ups. Perform snow removal in such a manner that protects the road and other adjacent resources. Do not use riparian areas, wetlands or streams for snow storage or disposal. Remove snow berms where they result in accumulation or concentration of snowmelt runoff on the road or erodible fill slopes. Install snow berms where such placement will preclude concentration of snowmelt runoff and will serve to rapidly dissipate melt water.
- k) On roads with high/heavy traffic use, require maintenance agreements and/or use of road surface stabilization practices and dust abatement supplements. See FSH 7709.56 and FSH 7709.58.

Management Measure 12: Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage.

Design Criteria:

- a) Site-prepare, drain, decompact, revegetate, and close temporary and intermittent use roads and other disturbed sites within one year after use ends. Provide stable drainage that disperses runoff into filter strips and maintains stable fills. Do this work concurrently. Stockpile topsoil where practicable to be used in site restoration. Use certified local native plants as practicable; avoid persistent or invasive exotic plants.
- b) Remove all temporary stream crossings (including all fill material in the active channel), restore the channel geometry, and revegetate the channel banks using certified local native plants as practicable; avoid persistent or invasive exotic plants.
- c) Restore cuts and fills to the original slope contours where practicable and as opportunities arise to re-establish subsurface pathways. Use certified local native plants as practicable; avoid persistent or invasive exotic plants. Obtain stormwater (402) discharge permits as required.
- d) Establish effective ground cover on disturbed sites to prevent accelerated on-site soil loss and sediment delivery to streams. Restore ground cover using certified native plants as practicable to meet revegetation objectives. Avoid persistent or invasive exotic plants.

Management Measure 13. Manage land treatments to limit the sum of severely burned soil and detrimentally compacted, eroded, and displaced soil to no more than 15 percent of any activity area.

Design Criteria:

- a) Restrict roads, landings, skid trails, concentrated-use sites, and similar soil disturbances to designated sites.
- b) Operate heavy equipment for land treatments only when soil moisture is below the plastic limit, or protected by at least one foot of packed snow or two inches of frozen soil.
- c) Conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives. This is usually done when the soil and duff are moist.

Management Measure 14. Maintain or improve long-term levels of organic matter and nutrients on all lands.

Design Criteria:

- a) On soils with surface soil (A-horizon) thinner than 1 inch, topsoil organic matter less than two percent, or effective rooting depth less than 15 inches, retain 80-90 percent of the fine (less than three inches in diameter) post treatment logging slash in the stand after each clearcut and seed-tree harvest. Consider need for retention of coarse woody debris slash in each activity area to balance soil quality requirements and fuel loading concerns.
- b) If machine piling of slash is done, conduct piling to leave topsoil in place and to avoid displacing soil into piles or windrows.

Management Measure 15. Place new sources of chemical and pathogenic pollutants where such pollutants will not reach surface or ground water.

Design Criteria:

- b) Locate vehicle service and fuel areas, chemical storage and use areas, and waste dumps and areas on gentle upland sites. Mix, load, and clean on gentle upland sites. Dispose of chemicals and containers in State-certified disposal areas.

Management Measure 16. Apply runoff controls to disconnect new pollutant sources from surface and ground water.

Design Criteria:

- a) Install contour berms and trenches around vehicle service and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills. Use liners as needed to prevent seepage to ground water. Prepare Spill Prevention Control and Countermeasure Plan per the requirements of 40 CFR 112.
- f) Report spills and take appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations. Contaminated soil and other material shall be removed

from NFS lands and disposed of in a manner according to state and federal laws, rules and regulations.

USDA Forest Service Guide to Noxious Weed Prevention Practices

Goal 1. Incorporate weed prevention and control into project layout, design, alternative evaluation, and project decisions.

Practice 1. Environmental analysis for projects and maintenance programs will need to assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.

Goal 2: Avoid or remove sources of weed seed to prevent new weed infestations and the spread of existing weeds.

Practice 2. Before ground-disturbing activities begin, inventory and prioritize weed infestations for treatment in project operating areas and along access routes. Identify what weeds are on site, or within reasonably expected potential invasion vicinity, and do a risk assessment accordingly.

Practice 3. After completing Practice 2 above, to reduce risk of spread, begin project operations in uninfested areas before operating in weed-infested areas.

Practice 4. Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict to those periods when spread of seed is least likely.

Practice 5. Determine the need for, and when appropriate identify, sites where equipment can be cleaned.

Practice 6. Clean all equipment before leaving project site if operating in areas infested with weeds. Determine the need for, and when appropriate identify, sites where equipment can be cleaned. Seeds and plant parts need to be collected and incinerated when practical. Use standard timber sale contract provisions to ensure appropriate equipment cleaning.

Practice 7. Workers (loggers, contractors, employees) need to inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment.

Practice 8. Coordinate project activities with any nearby herbicide application to maximize cost-effectiveness of weed treatments.

Goal 3. Prevent the introduction and spread of weeds caused by moving infested sand, gravel, borrow, and fill material in Forest, contractor, and cooperator operations.

Practice 10. Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources for eradication and strip and stockpile contaminated material before any use of pit material.

Practice 11. Inspect and document the area where material from treated weed-infested sources is used, annually for at least three years after project completion to ensure that any weeds transported to the site are promptly detected and controlled.

Practice 12. Maintain stockpiled uninfested material in a weed free condition.

Goal 4. In those vegetation types with relatively closed canopies, retain shade to the extent possible to suppress weeds and prevent their establishment and growth.

Practice 13. Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives.

Goal 5. Avoid creating soil conditions that promote weed germination and establishment.

Practice 14. Minimize soil disturbance to the extent practical consistent with project activities.

Goal 6. Where project disturbance creates bare ground consistent with project objectives, reestablish vegetation to prevent conditions to establish weeds.

Practice 15. Revegetate disturbed soil in a manner that optimizes plant establishment for that specific site.

Practice 16. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulch as necessary.

Practice 17. Use local (District-approved) seeding guidelines, mixes, seed testing, and procedures will be used to meet weed-free requirements.

Practice 18. Inspect and document all limited-term ground-disturbing actions in noxious-weed-infested areas for at least three growing seasons following completion of the project. For ongoing projects, continue to monitor until reasonable certainty is obtained that no weeds have occurred. Provide for follow-up treatments based on inspection results.